

Low-cost, low-risk tidal power technology

A successful, large-scale marine trial that proves a unique and innovative tidal power technology and has helped to secure further funding to take it to a commercial phase.

The need

The impact of climate change, escalating energy prices and uncertainties over the security of UK energy supplies make a compelling case for the development of new, large-scale renewable energy technologies. Highly predictable tidal power with an inherently low environmental impact is abundant, especially in UK waters. Demonstrating an affordable technology in shallow water where costs, risks and challenges are all lower than in deeper water would allow the UK to take an enormous step towards making tidal power a commercial reality.

The results

This project, led by Pulse Tidal and IT Power, designed, built, installed and tested a prototype 100 kW tidal power device off Immingham in the Humber Estuary. The device uses Pulse Tidal's unique and innovative dual-hydrofoil technology, Pulse Stream. Electricity from the test rig is fed directly to a chemical company on the south bank of the Humber.

The project successfully demonstrated that hydrofoils can capture energy from tidal flows with similar efficiencies to those of rotary devices.

The inherent advantage of hydrofoils is that they sweep a larger area of the water column than rotary devices thereby delivering more power per device in all but the deepest water. This gives Pulse Stream a distinct economic advantage. By demonstrating that, ultimately, generating costs for this technology will be lower than those for offshore wind, the project has also helped to break down perceptions that tidal power is too expensive.

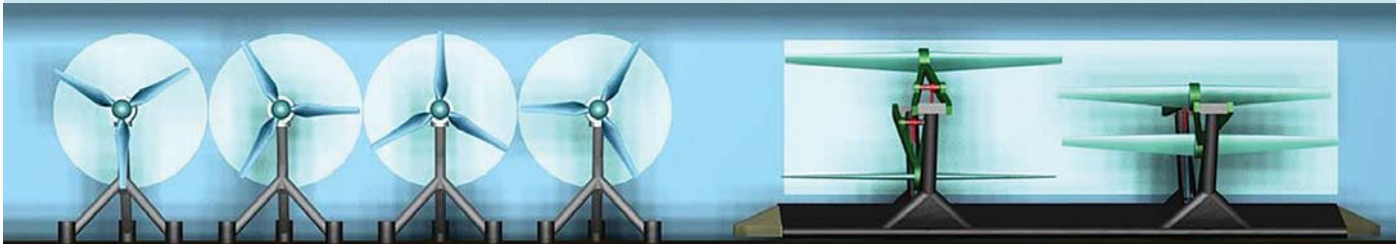
Pulse Stream technology

A single Pulse Stream device has horizontal blades that sweep a rectangular cross-section of the water column (the swept area). Blades are perpendicular to the tidal flow and their angle into the flow is controlled to generate 'lift' in the same way that an aeroplane wing creates lift. The angle is adjusted at the end of each stroke so as to move the blades up and down in a cycle.

Power output is a function of the efficiency of energy capture and the swept area. By having blades whose length is not limited by water depth, at a given depth of water, Pulse Stream can achieve a significantly larger swept area than rotary technologies. With equivalent energy capture efficiencies this means that Pulse Stream offers more power per device than competing technologies with considerable cost advantages.



Construction of blades for the Pulse Stream device



Cross section demonstrating the hydrofoil approach (right) in comparison to the rotary turbines (left).

Market potential

Commercialisation of Pulse Stream technology promises considerable benefits to the UK in terms of helping to meet its targets for renewable generation and establishing a world-leading position in a sector with enormous potential. Pulse Tidal estimates that its commercial plans to deploy 1 GW of Pulse Stream power generation by 2025 will create upwards of 5,000 jobs, provide annual revenues through equipment sales in excess of £300 million and offset around one million tonnes of carbon dioxide annually.

HOW THE TECHNOLOGY STRATEGY BOARD MADE A DIFFERENCE:

‘The project has made a major step towards commercialisation of tidal power.’

Bob Smith, CEO, Pulse Tidal

Next steps

The success of the project has helped Pulse Tidal Limited to secure an EU grant of €8 million towards a demonstration of the technology at a commercial scale. A 1 MW generator will be commissioned in 2012 and provide electricity for up to 1,000 homes. Pulse Tidal is now part of an international consortium including future supply chain partners. The consortium brings together the essential technical expertise necessary to develop and deploy this device, which will be the first unit in what will become one of the world's first commercial tidal-power arrays.

Project # 200014

Project partners

IT Power Limited (lead partner)
Pulse Tidal Limited
Senergy Econnect
BMT Fleet Technology
University of Hull
CIC Omece

Technology Strategy Board investment

£878,000

Total project investment

£2.2 million

Project contact details

Howard Nimmo
Pulse Tidal Limited
Electric Works
Sheffield
S1 2BJ

E howard.nimmo@pulsetidal.com
T 0114 286 6288

Technology Strategy Board Driving Innovation

Collaborative research and development projects are one of the tools that the Technology Strategy Board uses to drive innovation in the UK. The Technology Strategy Board is a business-led executive non-departmental public

body, established by the Government. Its role is to promote and support research into, and development and exploitation of, technology and innovation for the benefit of UK business, in order to increase economic growth and improve the quality of life. It is sponsored by the Department for Business, Innovation and Skills (BIS).

Tel: 01793 442700 www.innovateuk.org